US008628125B2

(12) **United States Patent**
Huang et al.

(10) **Patent No.: US 8,628,125 B2**
(45) **Date of Patent: Jan. 14, 2014**

(54) **LOCK STRUCTURE**

(75) Inventors: **Lien-Hsi Huang**, Kaohsiung (TW); **Kuang-Chun Chiang**, Kaohsiung County (TW)

(73) Assignee: **Taiwan Fu Hsing Industrial Co., Ltd.**, Kang Shan Town, Kaohsiung County (TW)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/604,393**

(22) Filed: **Sep. 5, 2012**

(65) **Prior Publication Data**

US 2012/0326455 A1 Dec. 27, 2012

Related U.S. Application Data

(63) Continuation of application No. 12/703,283, filed on Feb. 10, 2010, now abandoned.

(51) **Int. Cl.**
E05C 1/06 (2006.01)
E05C 1/00 (2006.01)

(52) **U.S. Cl.**
USPC **292/142**; 292/32; 292/34; 292/92; 292/279

(58) **Field of Classification Search**
USPC 292/32–34, 36, 37, 39, 42, 51, 92–94, 292/137–143, 145, 279, 280
See application file for complete search history.

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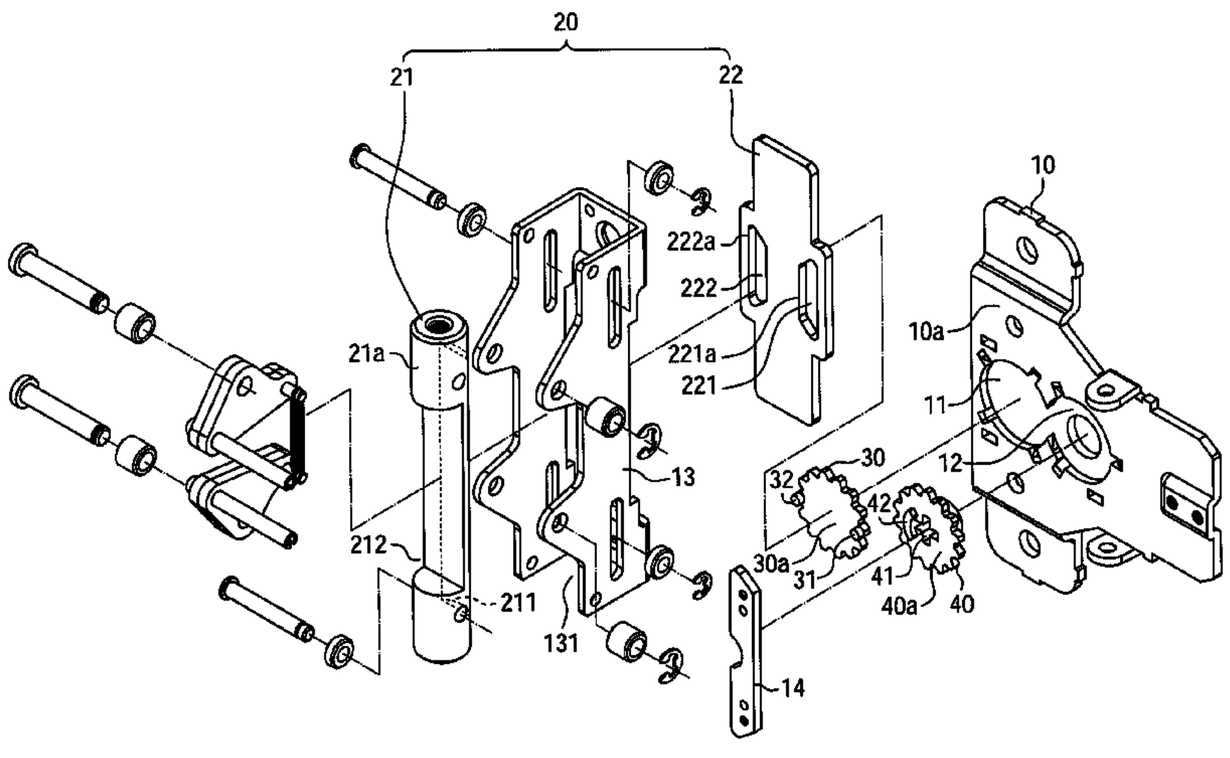
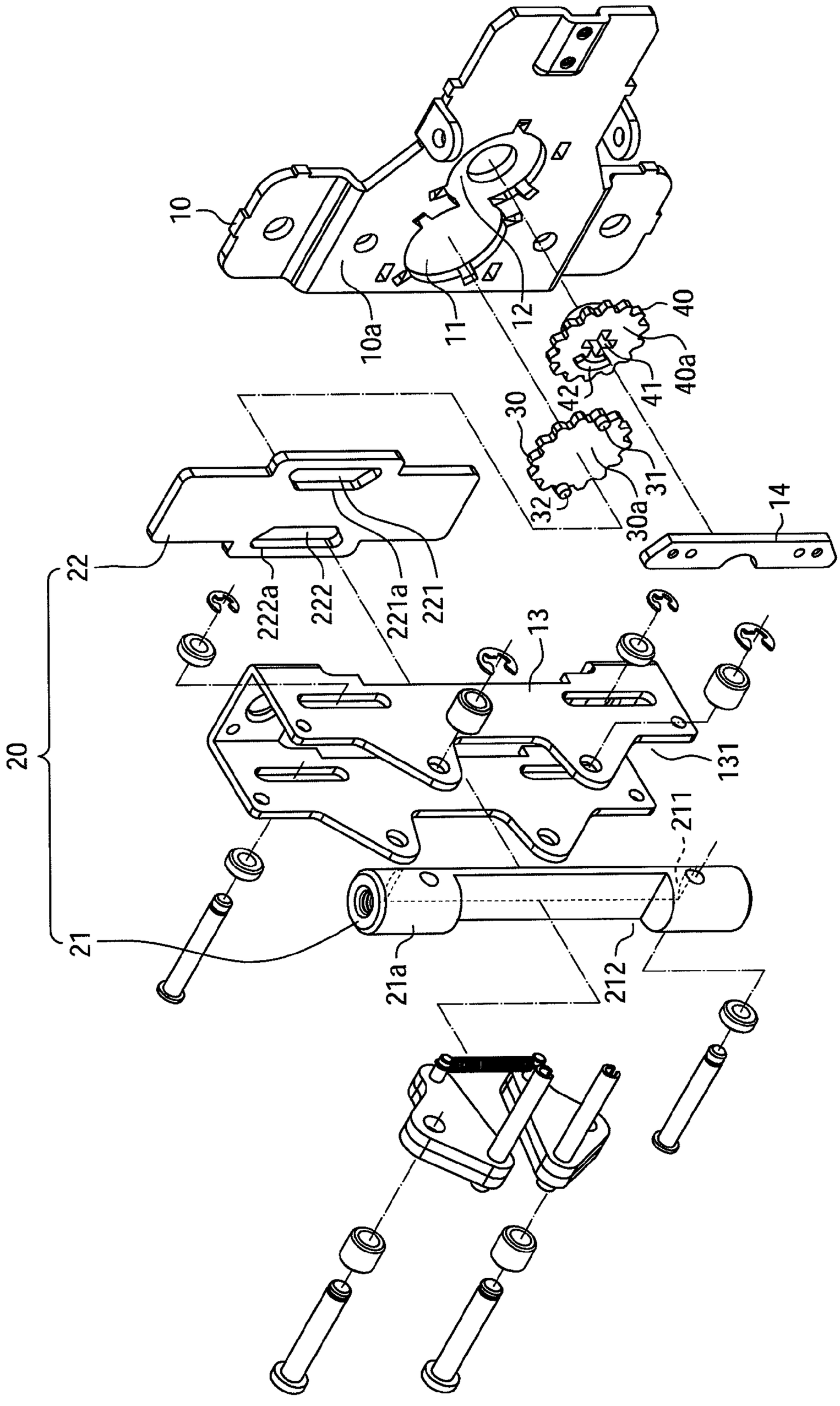
Primary Examiner — Carlos Lugo
(74) *Attorney, Agent, or Firm* — Muncy, Geissler, Olds & Lowe, PLLC

(57) **ABSTRACT**

A lock structure with at least one latch comprises a base, a link member, a sliding member and a rotating member. The link member is moveable relative to the base to drive the latch. The sliding member is engaged with the link member and being capable of driving the link member. The rotating member is rotatably disposed between the base and the sliding member, wherein the rotating member is capable of driving the sliding member and the link member to drive the latch.

15 Claims, 8 Drawing Sheets

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20
21
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212

FIG.1

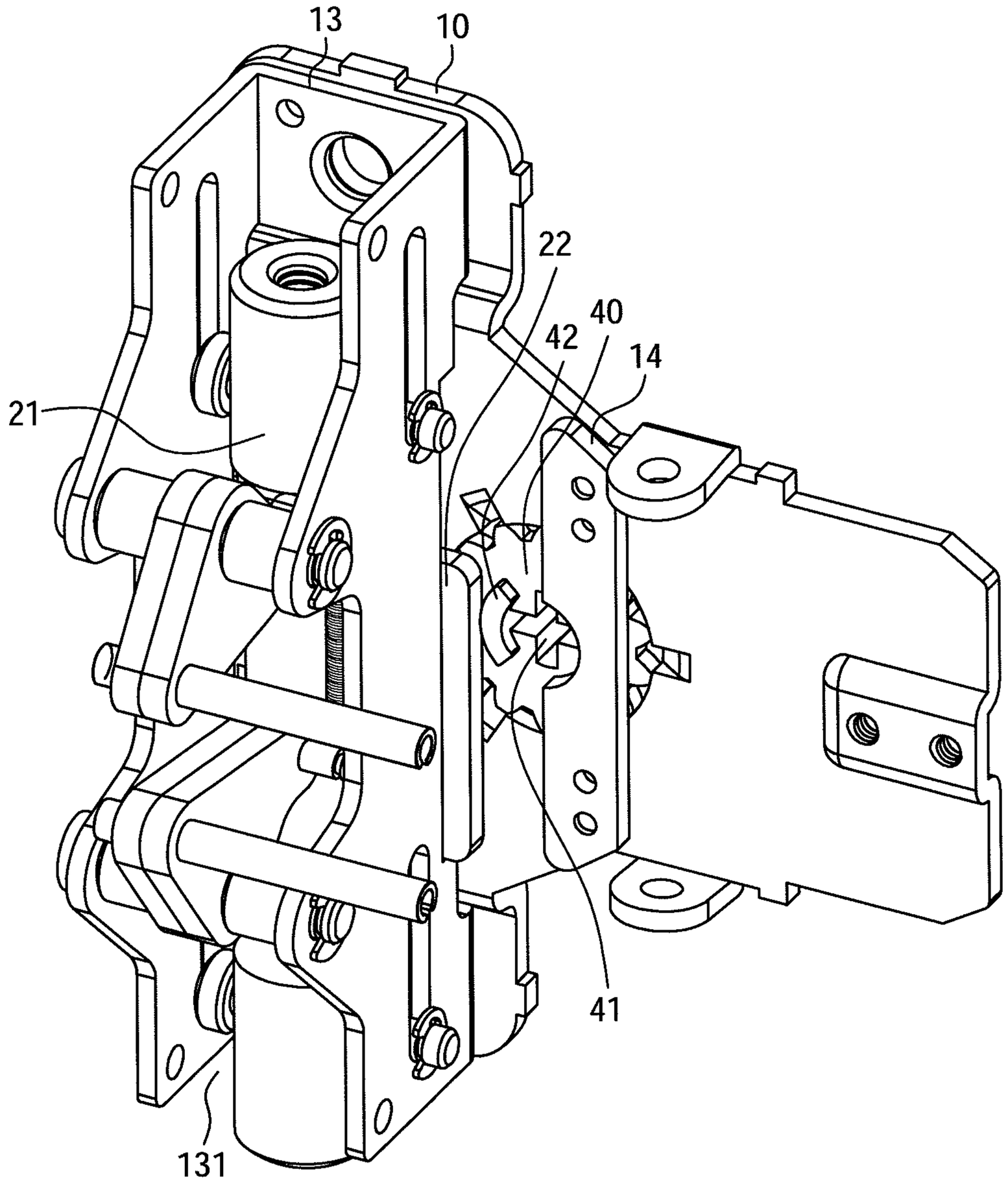
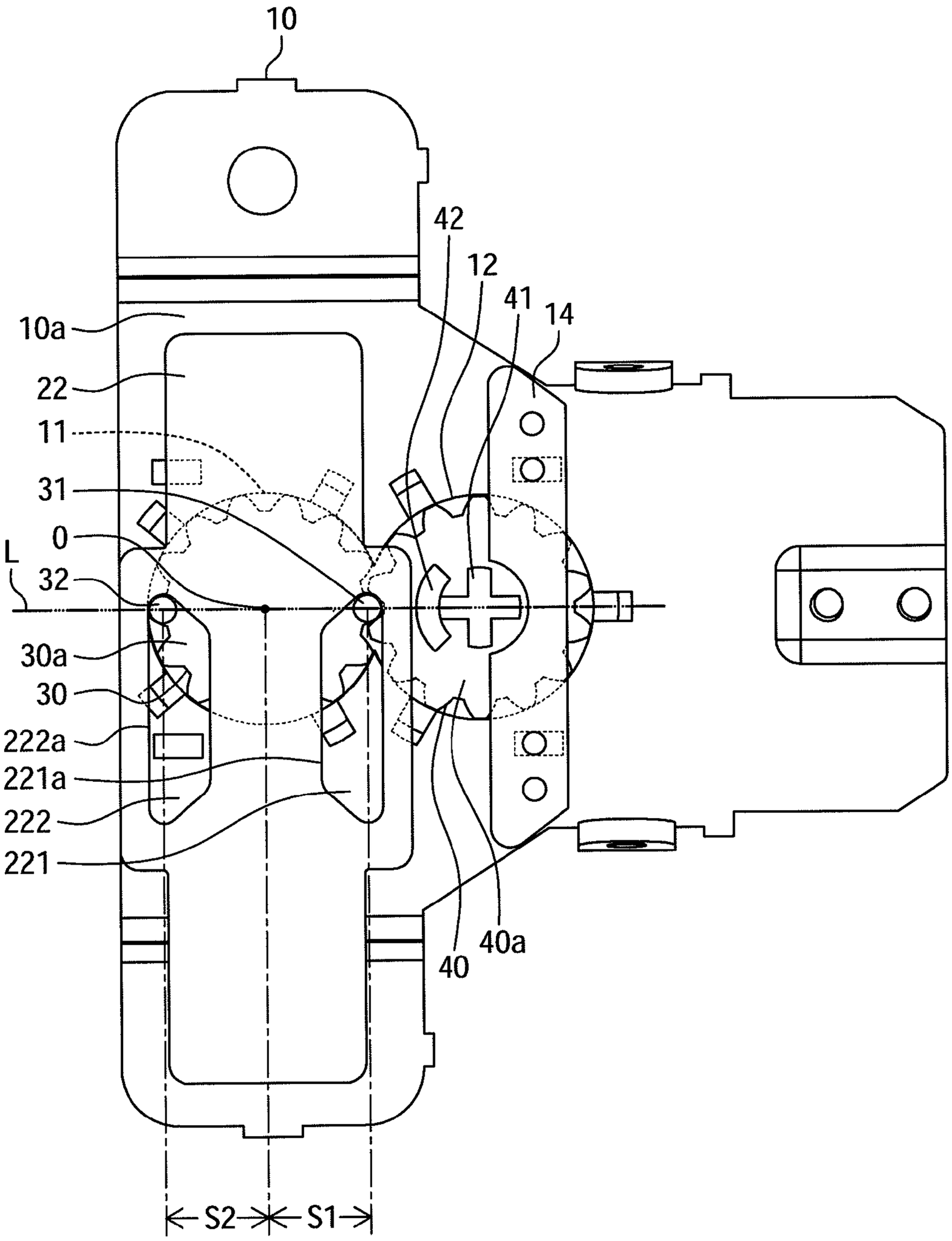


FIG.2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10a
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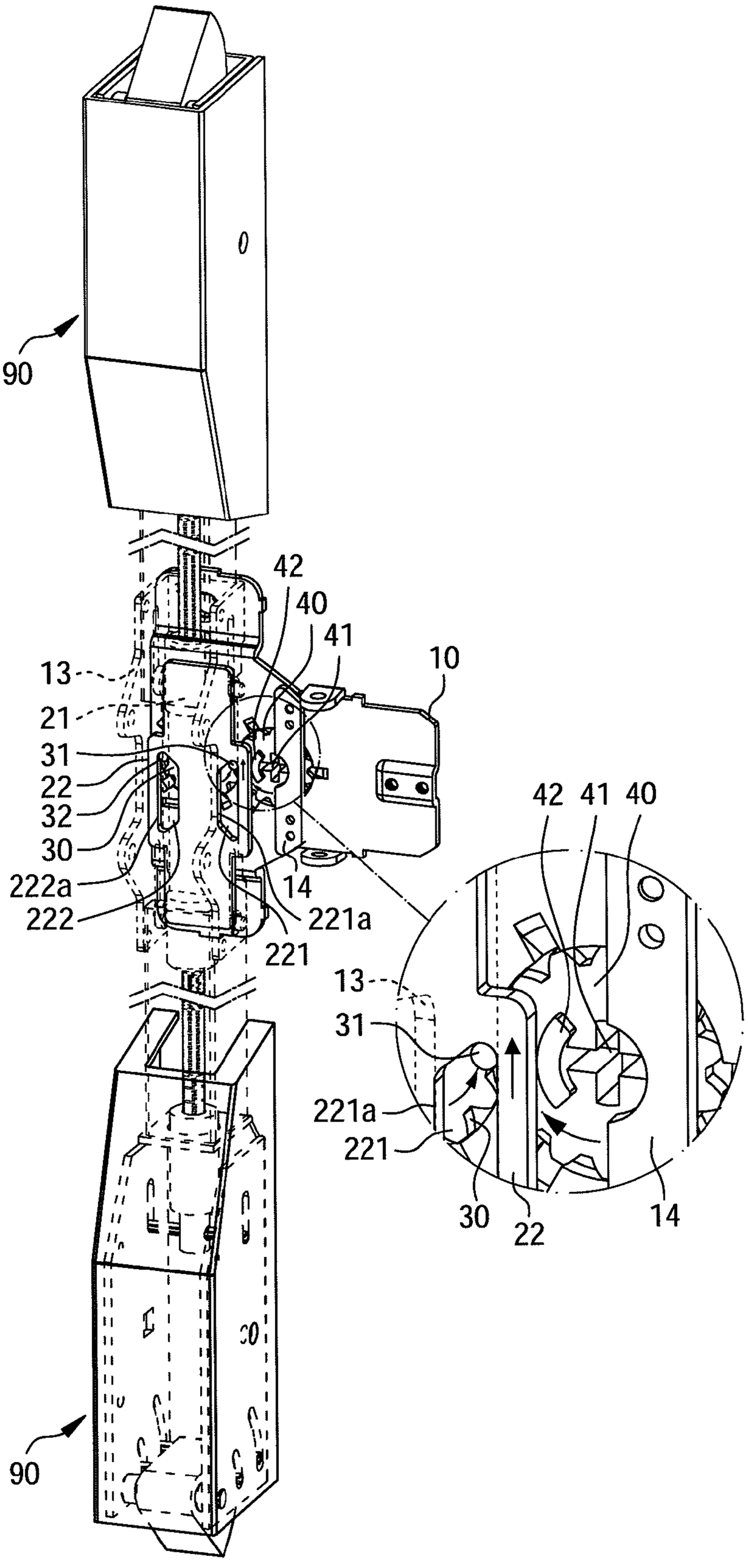
40
S2
S1

FIG.3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22
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42 41 40
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221a
221
30
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14
90

FIG. 4A

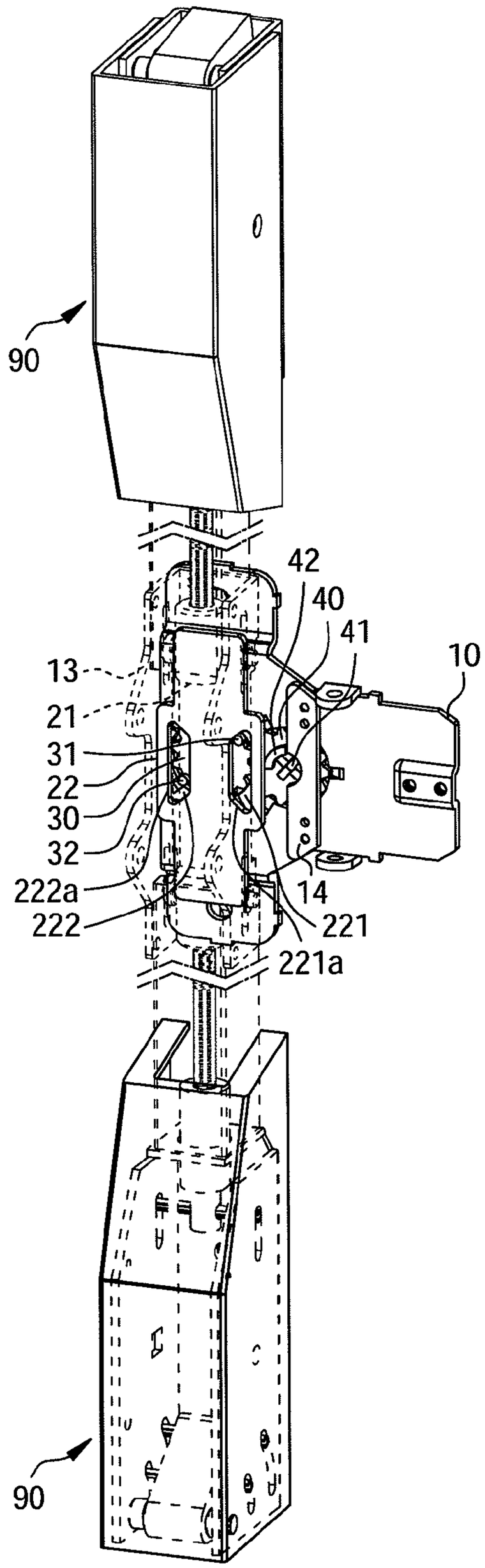

FIG. 4B

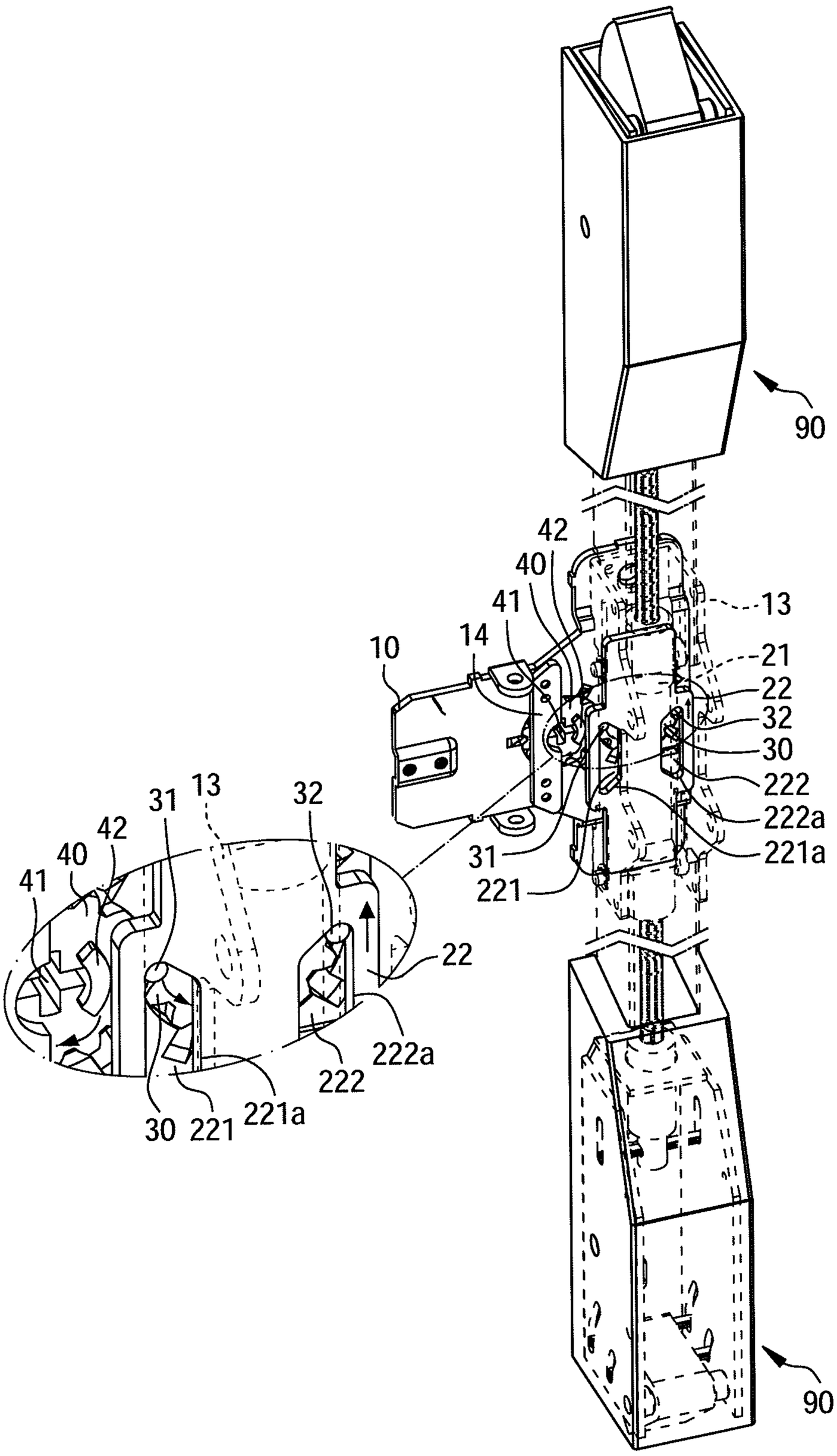
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FIG.5A

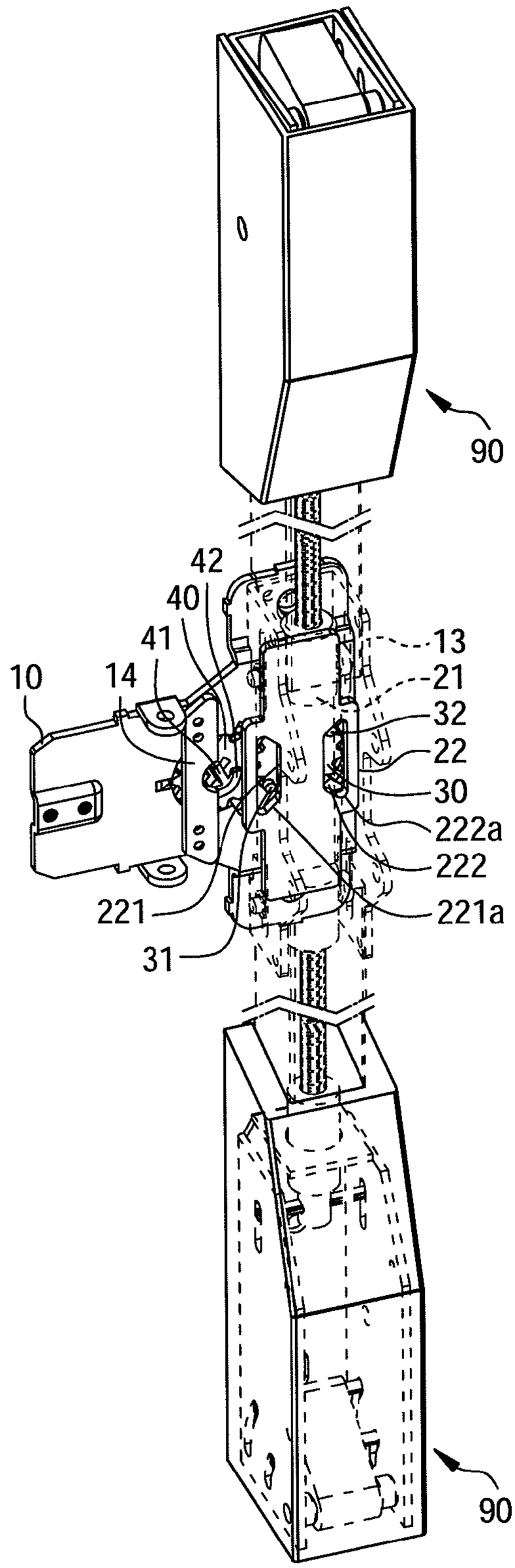

FIG.5B

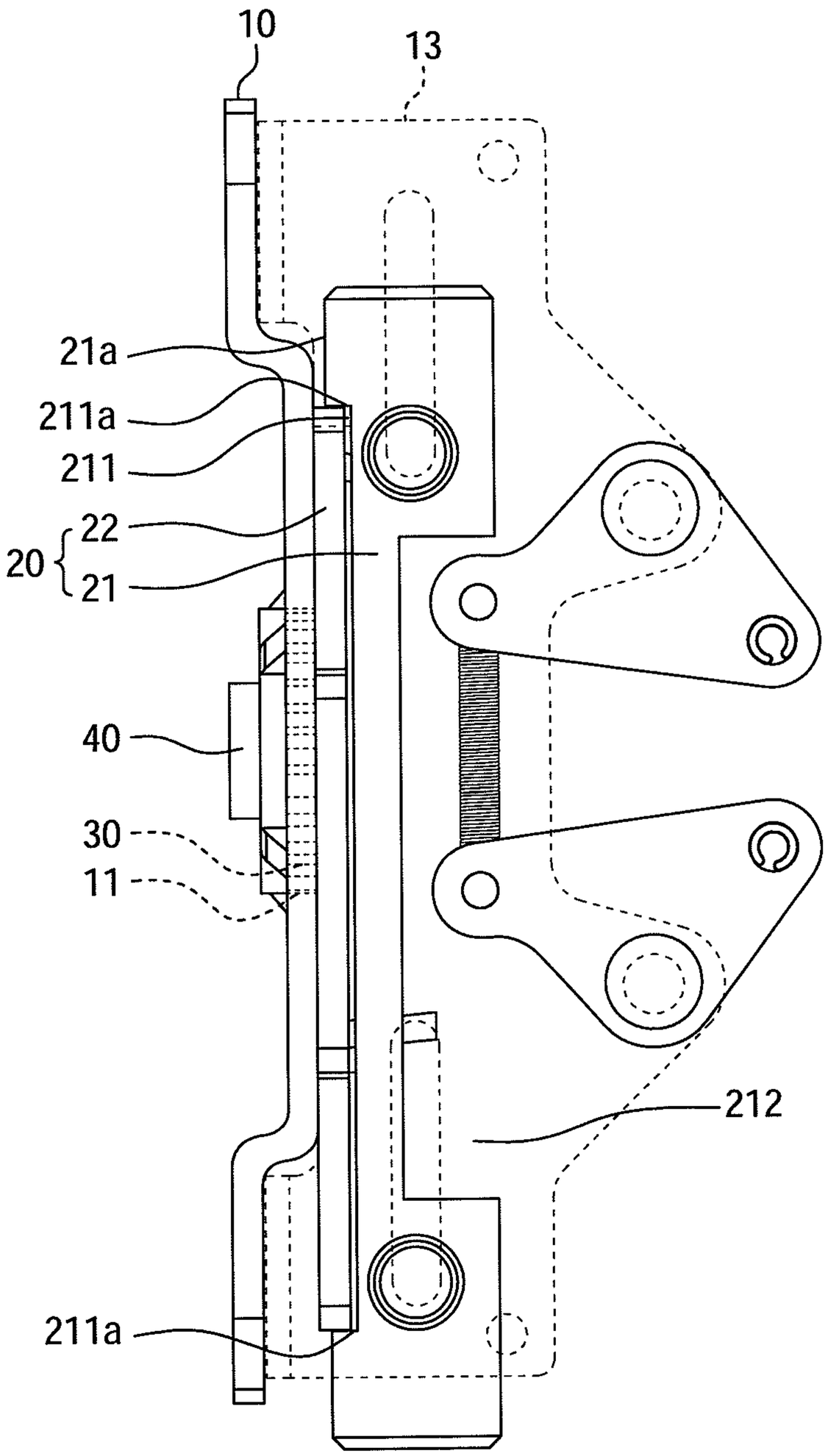

FIG.6

LOCK STRUCTURE

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation application of U.S. patent application Ser. No. 12/703,283, filed on Feb. 10, 2010 now abandoned, the benefits of which are claimed under 35 U.S.C. §120, and entire contents of which are hereby incorporated by reference.

FIELD OF THE INVENTION

The present invention is generally relating to a lock structure, more particularly to a lock structure of exit device.

BACKGROUND OF THE INVENTION

The known exit device uses a lock structure to control the unlocking and locking actions of the top and bottom latches. However, when the exit device is installed on the left-handed door from the right-handed door or otherwise due to change a design of building space or other safety considerations, an unlock rotation direction of the lock structure will be changed because of the lock structure of the known exit device only can unlock in single rotation direction, which will result persecution and inconvenience in operation for users. In order to overcome above problems, general users almost replace the lock structure with a new one and an additional outlay for replacing the lock structure will be needed.

SUMMARY

The primary object of the present invention is to provide a lock structure with at least one latch comprising a base, a movable assembly, a rotating member and a driving member. The base has a bottom surface, a first recession located at the bottom surface and a second recession in communication with the first recession. The movable assembly comprises a link member being moveable relative to the base and a sliding member capable of driving the link member, wherein the sliding member has a first opening and a second opening opposite to the first opening. The rotating member is disposed within the first recession of the base and has a first surface facing the sliding member, a first protrusion formed on the first surface and a second protrusion disposed opposite to the first protrusion, wherein the first protrusion and the second protrusion engage with the first opening and the second opening respectively. The driving member is disposed within the second recession of the base and engages with the rotating member. In present invention, the driving member is capable of driving the rotating member via clockwise rotation and enables the first protrusion of the rotating member to push the sliding member and move the link member thereby unlocking the latches, otherwise, the driving member is also capable of driving the rotating member via counterclockwise rotation and enables the second protrusion of the rotating member to push the sliding member and move the link member thereby unlocking the latches. Therefore, after the exit device is installed on the right-handed door from the left-handed door or otherwise, an unlock rotation direction of the driving member can be maintained without change, so it is good for users and an additional outlay for replacing the lock structure will be saved.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exploded perspective view illustrating a lock structure in accordance with a preferred embodiment of the present invention.

FIG. **2** is an assembled perspective view illustrating the lock structure.

FIG. **3** is a side view illustrating a portion of the lock structure.

FIG. **4**A-**4**B is an action view of the lock structure installed on the right-handed door.

FIG. **5**A-**5**B is an action view of the lock structure installed on the left-handed door.

FIG. **6** is a side view illustrating the lock structure.

DETAILED DESCRIPTION OF THE INVENTION

With reference to FIGS. **1**, **2** and **3**, a lock structure in accordance with a preferred embodiment of the present invention comprises a base **10**, a movable assembly **20**, a rotating member **30** and a driving member **40**. The base **10** has a bottom surface **10***a*, a first recession **11** located at the bottom surface **10***a*, a second recession **12** located at the bottom surface **10***a*, a supporting portion **13** disposed above the first recession **11** and a limiting component **14** located above the second recession **12**. In this embodiment, the first recession **11** and the second recession **12** are recessed from the bottom surface **10***a*, wherein the first recession **11** is in communication with the second recession **12** and the supporting portion **13** has an accommodating space **131**. The movable assembly **20** comprises a link member **21** being moveable relative to the base **10** and a sliding member **22** capable of driving the link member **21**. Referring to FIGS. **1**, **2** and **6**, the link member **21** is pivotally disposed within the accommodating space **131** of the supporting portion **13** and has an outside wall **21***a*, an accommodating area **211** recessed form the outside wall **21***a* and a concave **212** opposite to the accommodating area **211**, besides the accommodating area **211** has at least one abutting surface **211***a*. The sliding member **22** is disposed into the accommodating area **211** of the link member **21** and located between the link member **21** and the rotating member **30**, preferably the sliding member **22** contacts against the abutting surface **211***a* of the accommodating area **211** to engage with the link member **21**. The sliding member **22** has a first opening **221** and a second opening **222** opposite to the first opening **221**, wherein the first opening **221** has an inner wall **221***a* and the second opening **222** has an inner wall **222***a*.

Referring to FIGS. **1**, **2** and **3** again, the rotating member **30** is rotatably disposed at the first recession **11** of the base **10** and located between the base **10** and the sliding member **22**. The rotating member **30** has a center O, a first surface **30***a* facing the sliding member **22**, a first protrusion **31** formed on the first surface **30***a* and a second protrusion **32** disposed opposite to the first protrusion **31**, the first protrusion **31** and the second protrusion **32** engage with the first opening **221** and the second opening **222** of the sliding member **22** respectively. Preferably, the first protrusion **31** and the second protrusion **32** are capable of contacting against the inner wall **221***a* of the first opening **221** and the inner wall **222***a* of the second opening **222** respectively for driving the sliding member **22**. In this embodiment, the center O, the first protrusion **31** and the second protrusion **32** are located on a same straight line L, wherein there is a first gap S**1** between the first protrusion **31** and the center O and there is a second gap S**2** between the second protrusion **32** and the center O, preferably the second gap S**2** is equal to the first gap S**1** that allows the first protrusion **31** and the second protrusion **32** to drive the sliding member **22** with same acting moments. Referring to FIGS. **1**, **2** and **3** again, the driving member **40** is rotatably disposed within the second recession **12** of the base **10** and capable of driving the rotating member **30** via a chain, a transmission gear, directly engaging with the rotating mem-

ber **30** or other driving methods. In this embodiment, the driving member **40** and the rotating member **30** are gears, preferably the driving member **40** is capable of engaging with the rotating member **30** and driving it. Besides, the driving member **40** has a second surface **40***a* facing the limiting component **14**, a central cross hole **41** and a limiting protrusion **42** formed on the second surface **40***a* and at one side of the central cross hole **41**, preferably the limiting protrusion **42** is in shape of arc, and furthermore the limiting protrusion **42** is capable of selectively contacting against the limiting component **14** of the base **10** to limit a rotation angle of the driving member **40**.

With reference to FIGS. **4**A and **4**B, an action about the lock structure installed on the right-handed door is shown. First, FIG. **4**A shows the lock structure installed on the right-handed door in locking state, in which the first protrusion **31** and the second protrusion **32** of the rotating member **30** contact against the inner wall **221***a* of the first opening **221** and the inner wall **222***a* of the second opening **222** respectively. Besides, the link member **21** is connected with the top and bottom latches **90**. With reference to FIGS. **4**A and **4**B, when an unlocking step needs to be performed, it is capable of using a key or a handle (not shown in the drawings) to drive the driving member **40** in clockwise rotation and drive the rotating member **30** in counterclockwise rotation, and meantime the first protrusion **31** of the rotating member **30** pushes the inner wall **221***a* of the first opening **221** to move the sliding member **22** and drive the link member **21** to move upward thereby unlocking the top and bottom latches **90**. In this embodiment, when the driving member **40** is rotated to a suitable angle, the limiting protrusion **42** of the driving member **40** contacts against the limiting component **14** of the base **10** to limit the rotation angle of the driving member **40**.

With reference to FIGS. **5**A and **5**B, an action about the lock structure installed on the left-handed door is shown. First, FIG. **5**A shows the lock structure installed on the left-handed door in locking state, in which the first protrusion **31** and the second protrusion **32** of the rotating member **30** contact against the inner wall **221***a* of the first opening **221** and the inner wall **222***a* of the second opening **222** respectively. Besides, the link member **21** is connected with the top and bottom latches **90**. With reference to FIGS. **5**A and **5**B, when an unlocking step needs to be performed, it is capable of using a key or a handle (not shown in the drawings) to drive the driving member **40** in clockwise rotation and drive the rotating member **30** in counterclockwise rotation, and meantime the second protrusion **32** of the rotating member **30** pushes the inner wall **222***a* of the second opening **222** to move the sliding member **22** and drive the link member **21** to move upward thereby unlocking the top and bottom latches **90**. In this embodiment, because of the driving member **40** is capable of driving the rotating member **30** via clockwise rotation or counterclockwise rotation, so no matter what the exit device is installed on the left-handed or right-handed door, the unlock rotation direction of the driving member **40** can be maintained without change, so it is good for users and an additional outlay for replacing the lock structure will be saved.

While the present invention has been particularly illustrated and described in detail with respect to the preferred embodiments thereof, it will be clearly understood by those skilled in the art that various changed in form and details may be made without departing from the spirit and scope of the present invention.

What is claimed is:

1. A lock structure comprising a latch mechanism, a drive mechanism and a base, wherein the latch mechanism is configured to lock or unlock along a longitudinal axis, the drive mechanism includes a driving member, a rotating member, and a sliding member, wherein the driving member and the rotating member are engaged mutually, the driving member is driven along an unlock direction in response to a force exerted manually, and the sliding member is moved along the longitude axis to drive the latch mechanism to unlock by the rotation of the rotating member which is driven by the driving member, and the driving member is selectively mounted at a first position which is not aligned with the longitudinal axis or a second position which is opposite to the first position, wherein the unlock direction of the driving member is the same whether the driving member is mounted at the first position or at the second position, and the driving member is rotatable until a first feature of the driving member is engaged with a second feature of the base so that the rotation angle of the driving member is limited, wherein the driving member is mounted or the base, the base having a bottom surface, a first recession recessed from the bottom surface and a second recession recessed from the bottom surface, the first recession and the second recession are intercommunicated with each other, the rotating member and the driving member are disposed within the first recession and the second recession respectively, and, when the lock structure is mounted at a left handed position of a door, the base is mounted at the first position; and when the lock structure is mounted at a right handed position of the door, the base is mounted at the second position.

2. The lock structure in accordance with claim **1**, wherein the rotating member and the sliding member are located across the longitude axis.

3. The lock structure in accordance with claim **1**, wherein the base is selectively mounted at two alternatively mirror positions such that the driving member is mounted at the first position or at the second position.

4. The lock structure in accordance with claim **3**, wherein the base is a T-shaped plate.

5. The lock structure in accordance with claim **1**, wherein the latch mechanism comprises a latch and a link member coupled to the latch, the sliding member engages with and drives the link member, and the link member is movable relative to the base.

6. The lock structure in accordance with claim **5**, wherein the rotating member is rotatably disposed between the sliding member and the link member.

7. The lock structure in accordance with claim **5**, wherein the link member has a concave and an accommodating area, the sliding member is disposed into the accommodating area.

8. The lock structure in accordance with claim **7**, wherein the accommodating area of the link member has at least one abutting surface, the sliding member contacts against the abutting surface.

9. The lock structure in accordance with claim **1**, wherein the rotating member has a first surface facing toward the sliding member, a second surface opposite to the first surface and a first protrusion formed on the first surface, the second surface faces toward the base, the sliding member has a first opening, and the first protrusion is engaged with the first opening of the sliding member.

10. The lock structure in accordance with claim **9**, wherein the sliding member further comprises a second opening opposite to the first opening, the rotating member further com-

prises a second protrusion formed on the first surface, and the second protrusion is engaged with the second opening of the sliding member.

11. The lock structure in accordance with claim **10**, wherein the rotating member has a center, the center, the first protrusion and the second protrusion are located on a same straight line.

12. The lock structure in accordance with claim **11**, wherein there is a first gap between the first protrusion and the center, and there is a second gap between the second protrusion and the center, the second gap is equal to the first gap.

13. The lock structure in accordance with claim **9**, wherein the driving member engages with the rotating member.

14. The lock structure in accordance with claim **13**, wherein the rotating member and the driving member are gears.

15. The lock structure in accordance with claim **1**, wherein the second feature of the base is a limiting component located above the second recession, the first feature of the driving member is a limiting protrusion selectively contacted against the limiting component of the base.

* * * * *